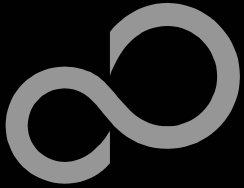




FUJITSU

CONCERTO-Kit





Overview



■ Introduction

- [About the CONCERTO-Kit](#)
- [CONCERTO-Kit content](#)
- [Test it](#)
- [The hardware](#)
- [The software](#)

■ Try yourself

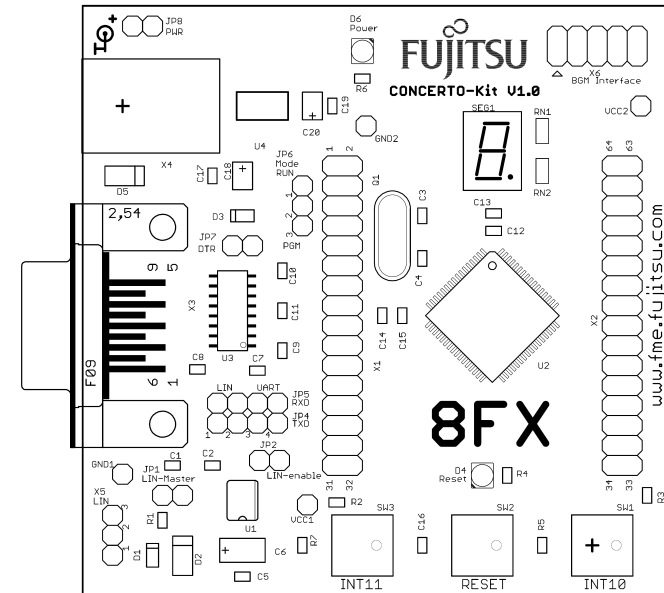
- [Software examples](#)
- [Program download](#)
- [New project](#)

■ Optional tools

- [Emulator, Programmer, etc.](#)

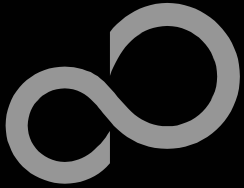
■ 8FX product overview

■ Contacts



■ Additional documents

- [Schematic 'CONCERTO-Kit'](#)
- [Data sheet MB95100 series](#)
- [Hardware manual 8FX family](#)
- [Application note 'Getting Started'](#)
- [Application note 'Emulator HW Setup'](#)
- [Application note 'Flash Programming'](#)

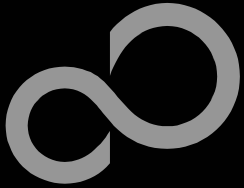


About the CONCERTO-Kit



- The CONCERTO-Kit is a low-cost evaluation board based on the Fujitsu 8FX microcontroller MB95F108AHS

- The MB95F108AHS microcontroller includes the following features:
 - 60KB Dual-Flash Memory
 - 2KB RAM
 - 1x UART/SIO
 - 1x LIN-USART
 - 1x I²C
 - Timers (Reload Timer, PPGs, others)
 - ADC
 - External interrupts
 - Others

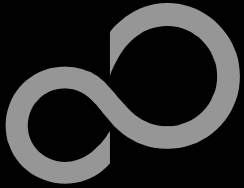


About the **CONCERTO-Kit**



■ The **CONCERTO-Kit** evaluation board includes the following features:

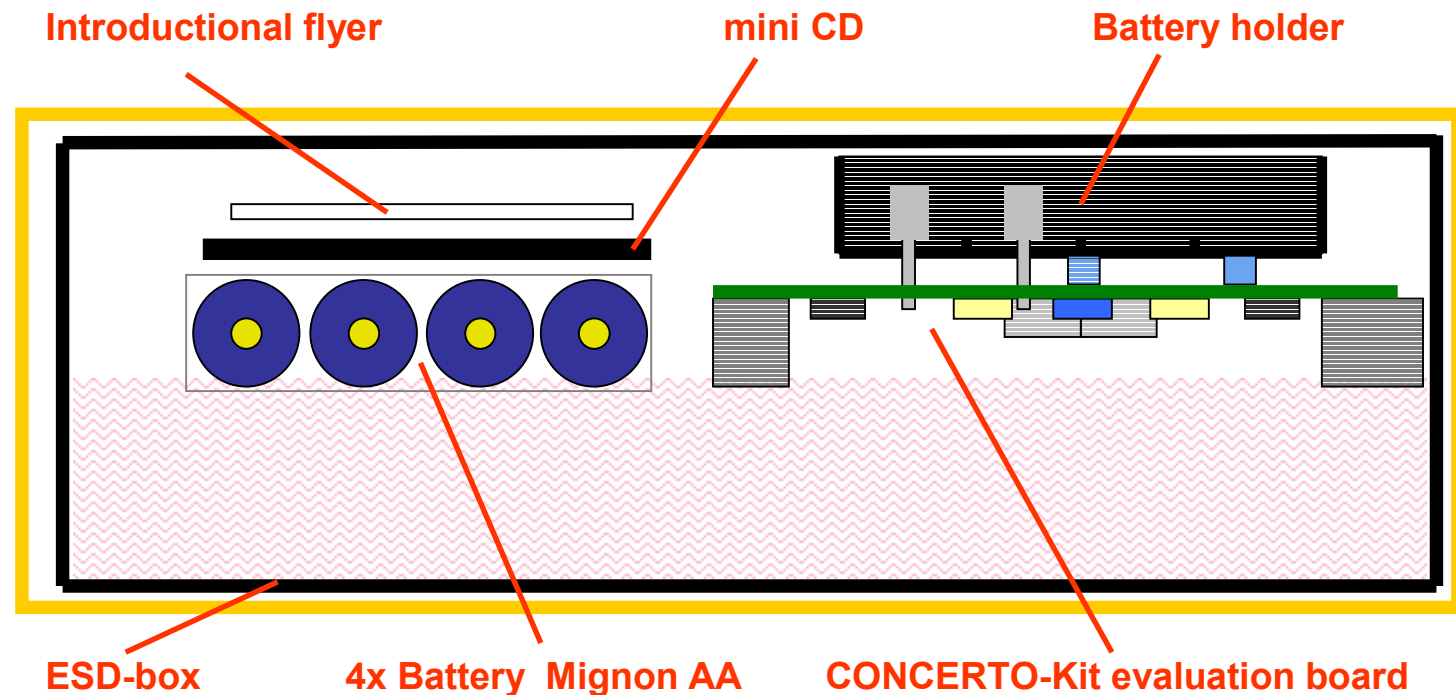
- Microcontroller MB95F108AHS
- 1x UART-transceiver (SUB-D9 connector)
- 1x LIN-transceiver (3-pin header)
- 1x 7-segment LED-Display
- 2x 'User'-button
- 1x 'Reset'-button, 'Reset'-LED
- All 64 pins routed to pin-header
- On-board 5V voltage regulator, 'Power'-LED
- Battery-supply (external power supply possible)

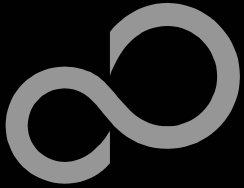


CONCERTO-Kit content

■ The CONCERTO-Kit contains

- CONCERTO-Kit evaluation board
- 4x Battery Mignon AA
- 1-page introductory flyer
- Mini CD with documentation and software examples





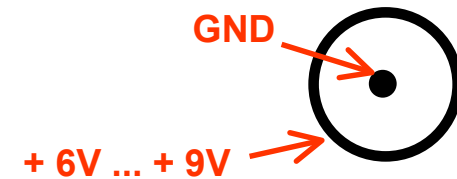
Test it



- Put the batteries into the battery holder (close JP8!)

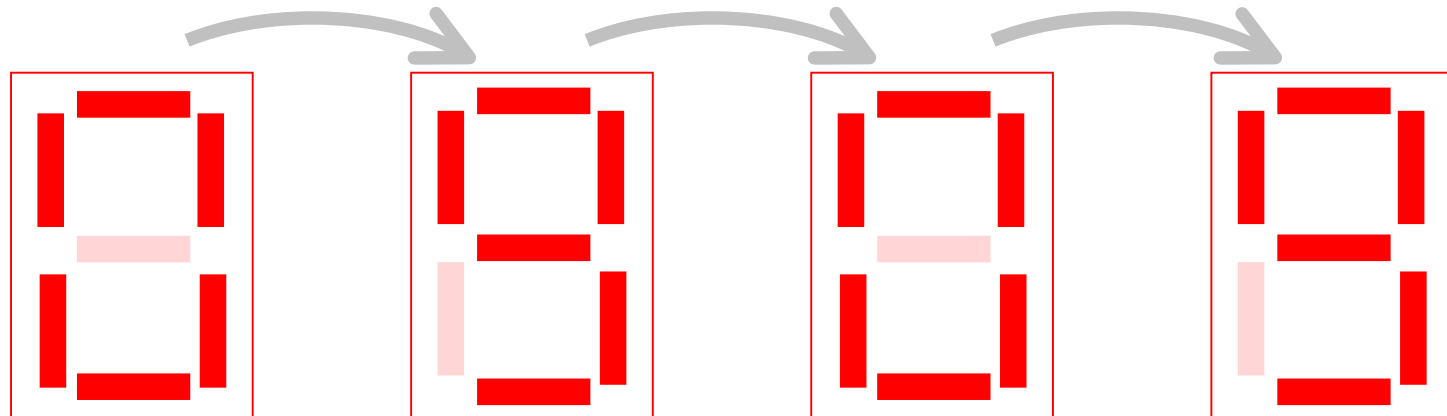
or

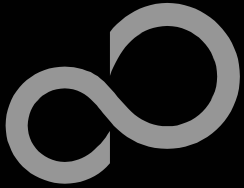
- connect an optional external power supply



- Press the ,Reset'- button

- The software starts automatically counting from 0 to 9 on the 7-segment display.

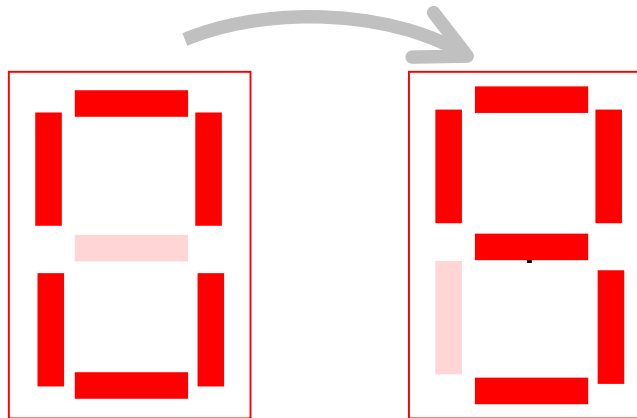




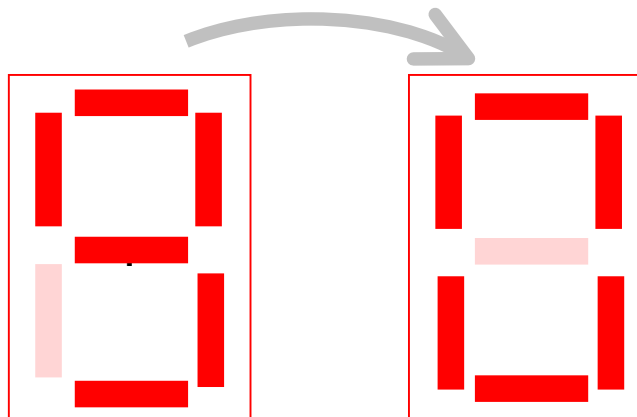
Test it

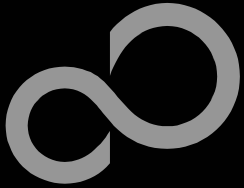


- Press ,User'-button ,INT10' to set counter direction to up



- Press ,User'-button ,INT11' to set counter direction to down



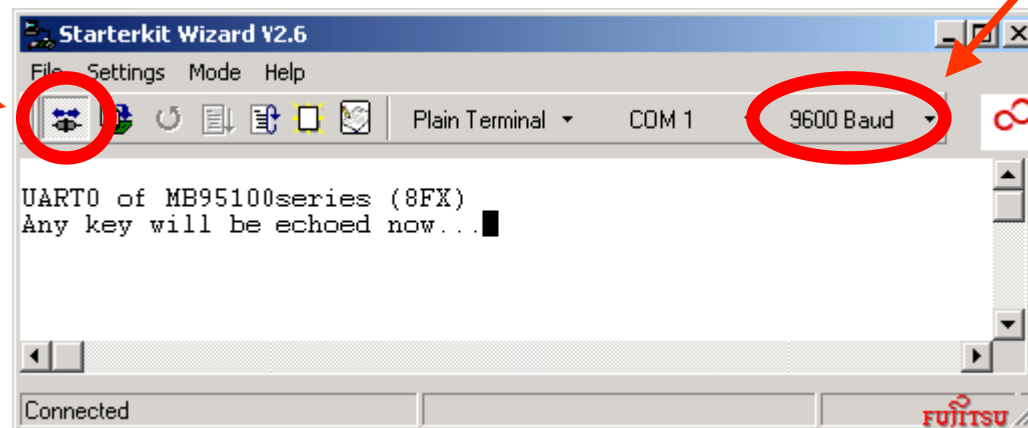


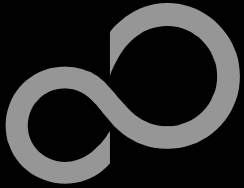
Test it

- Connect the ,SubD9'-connector (X3) to the PC's COM port via 1:1 serial cable
- Start a terminal application on your PC and set it to 9600 baud (use for example **SKwizard** terminal on this CD)
- Press the ,Connect'-Button in SKwizard
- Press the ,Reset'-Button on CONCERTO-Kit
- A welcome string is output via UART

,Connect'-
Button

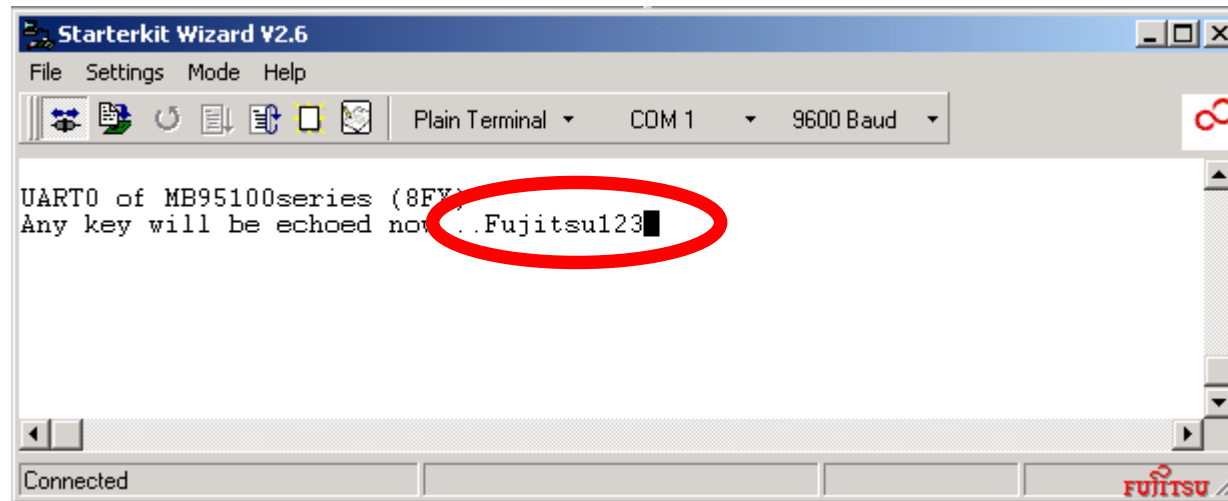
Baud rate
setting

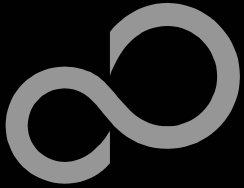




Test it

- Send a character to the CONCERTO-Kit by pressing a character key on your keyboard
- The character is echoed by the microcontroller and displayed in terminal application





Test it

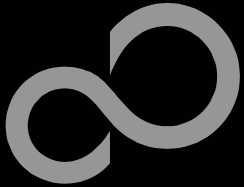


Congratulations!

- You finished successfully the first test

- In the following you will get more details about the CONCERTO-Kit

- You will learn more about
 - The on-board features
 - How to program the flash
 - How to start your own application

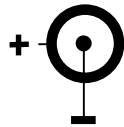


The Hardware

■ Main-features

Ext. Power

+6V ... +9V



UART

Use 1:1 cable for PC-connection

LIN

- 1 Vbat
- 2 GND
- 3 LIN

LED ,Power'

7-Segment Display



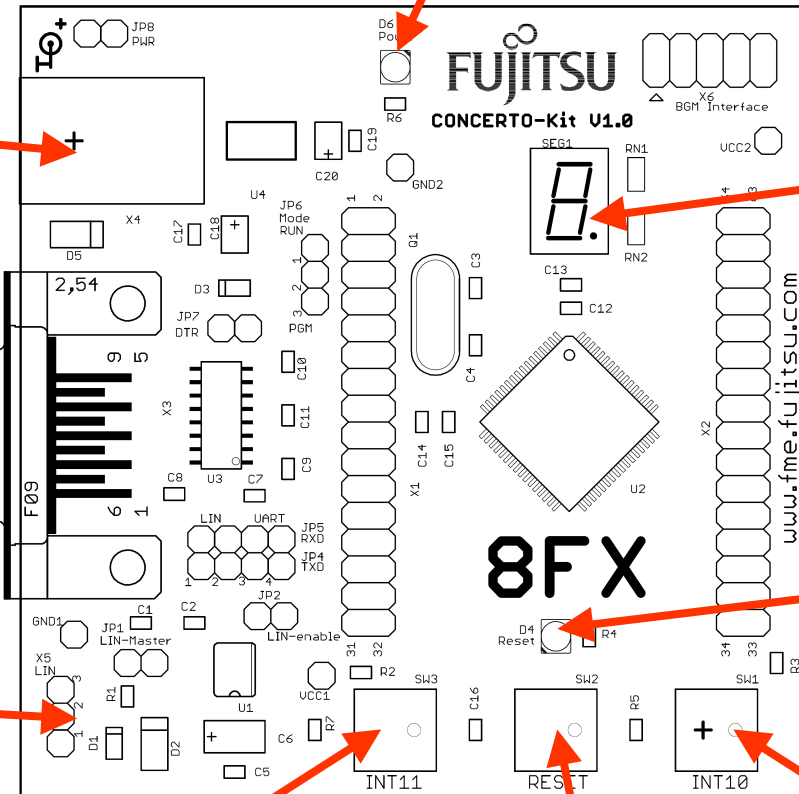
Keybutton ,INT11'

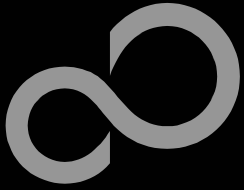
Port PE1

Keybutton ,RESET'

Keybutton ,INT10'

Port PE2





The Hardware

■ The jumpers



JP6: Mode selection

RUN: Set jumper to position 1-2 in order to select the run-mode

PGM: Set jumper to position 2-3 in order to select the program-mode

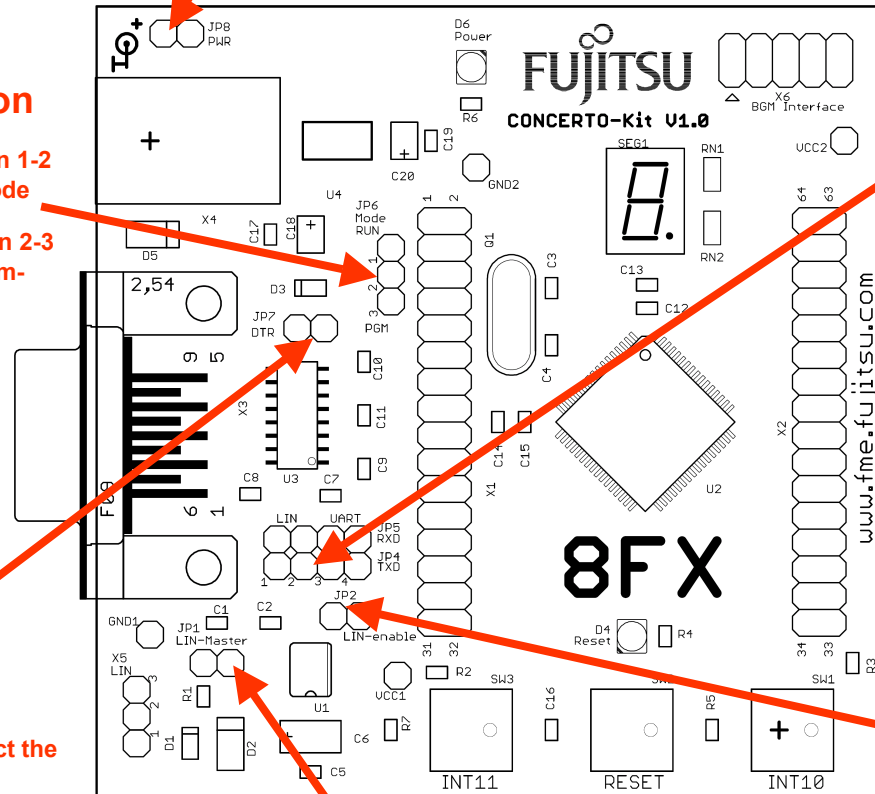
JP7: DTR-Reset

Close the jumper to connect the DTR-Signal to the microcontroller reset-pin.

Some terminal-programs, e.g. Fujitsu SKwizard, allow to reset the evaluation board by using the DTR-Signal.

JP8: Battery power

Close the jumper to power the module by the battery pack



JP4 & JP5: TxD/RxD connection

These jumpers are used for settings of LIN and USART connection.

Following settings are possible:

1-2: SOT/SIN (LIN-USART) are connected to LIN transceiver

2-3: SOT/SIN (LIN-USART) are connected to MAX232 for UART communication

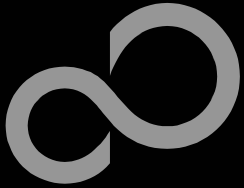
3-4: UI0/UO0 (UART) are connected to MAX232 for UART communication

JP1: LIN Master mode

Close the jumper to set LIN node in master mode

JP2: LIN enable

Close the jumper to enable operation of LIN driver device



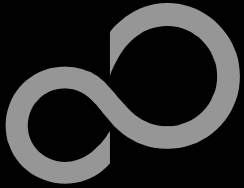
The Hardware



■ The microcontroller pins

Pin	Pin-name	On CONCERTO-Kit used by
1	AVcc	+ 5V
2	AVR	+ 5V
3	PE3/INT13	
4	PE2/INT12	
5	PE1/INT11	Button 'INT10'
6	PE0/INT10	Button 'INT11'
7	P83	
8	P82	
9	P81	
10	P80	
11	P71/T10	
12	P70/T00	
13	MOD	Jumper JP6 'Mode'
14	X0	4MHz crystal
15	X1	4MHz crystal
16	Vss	GND

Pin	Pin-name	On CONCERTO-Kit used by
17	Vcc	+ 5V
18	PG0/(C pin)	100n ,C' Capacitor
19	X1A/PG2	
20	X0A/PG1	
21	/RST	Button 'Reset', BGM-I/F
22	P00/INT0	SEG-A
23	P01/INT01	SEG-B
24	P02/INT02	SEG-C
25	P03/INT03	SEG-D
26	P04/INT04	SEG-E
27	P05/INT05	SEG-F
28	P06/INT06	SEG-G
29	P07/INT07	SEG-DP
30	P10/UI0	Jumper JP5 'Rx'D' (UART), BGM-I/F
31	P11/UO0	Jumper JP4 'Tx'D' (UART), BGM-I/F
32	P12/UCK0	BGM-I/F



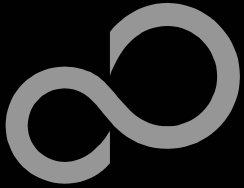
The Hardware



■ The microcontroller pins (cont'd)

Pin	Pin-name	On CONCERTO-Kit used by
33	P13/TRG0/ADTG	4k7 Ohm resistor
34	P14/PPG0	
35	P20/PPG00	
36	P21/PPG01	
37	P22/TO00	
38	P23/TO01	
39	P24/EC0	
40	P50/SCL0	
41	P51/SDA0	
42	P52/PPG1	
43	P53/TRG1	
44	P60/PPG10	
45	P61/PPG11	
46	P62/TO10	
47	P63/TO11	
48	P64/EC1	

Pin	Pin-name	On CONCERTO-Kit used by
49	P65/SCK	
50	P66/SOT	Jumper JP5 'RxD' (LIN/USART)
51	P67/SIN	Jumper JP4 'TxD' (LIN/USART)
52	P43/AN11	
53	P42/AN10	
54	P41/AN09	
55	P40/AN08	
56	P37/AN07	
57	P36/AN06	
58	P35/AN05	
59	P34/AN04	
60	P33/AN03	
61	P32/AN02	
62	P31/AN01	
63	P30/AN00	
64	AVss	GND



The Software



■ The CONCERTO-Kit CD includes the following software packages

- Softune Workbench (development platform for Fujitsu microcontroller)
- MCU flash programmer tool for 8FX family
- Utilities (SKwizard terminal)
- Software examples for the CONCERTO-Kit

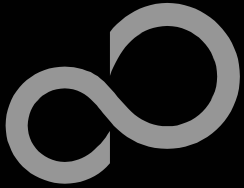
■ Additionally you can order the „Fujitsu MICROS CD V3.6“

- Includes documentation & software for all Fujitsu microcontrollers
- Please contact your local distributor

■ Please check our dedicated microcontroller web-site

www.fme.gsdc.de/gsdc.htm

- for updates of the flash programmer tool, utilities and examples
- for data sheets, hardware manuals, application notes, etc.



The Software



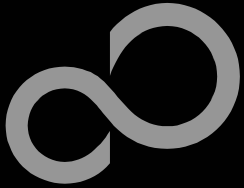
■ Softune Workbench

- Free of charge (only registration is required)
- Windows based development platform for all 8-bit FX microcontrollers
- Includes: editor, C-compiler, assembler, linker, core simulator
- Supports optional hardware emulator

- Please fill in the [registration-form](#) and send it to
 - micro_info@fme.fujitsu.com or FAX: ++49-(0)6103-690-122
 - Receive your password by email

- Requires 'administration' or 'power user' rights on the PC

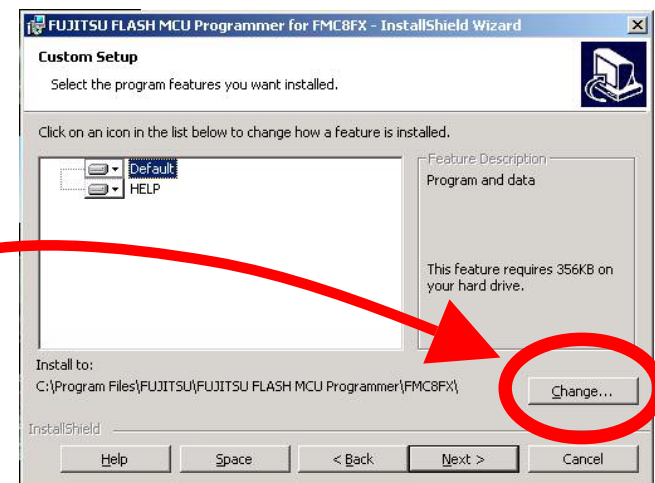
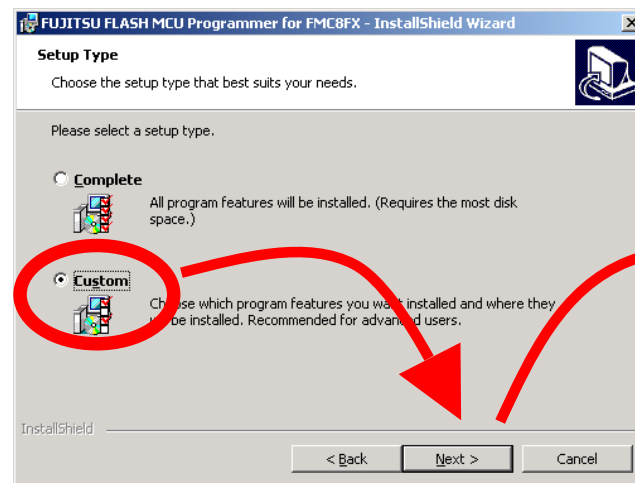
- [Start installation](#)
 - Enter password and choose destination folder (e.g. c:\Softune8)

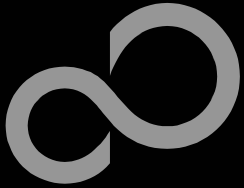


The Software

■ MCU flash programmer

- Free of charge, no registration required
- Windows based programming tool for all 8-bit FX Fujitsu microcontrollers
- Uses PC serial port COMx
- Start installation
 - Select custom installation and select “change...” in order to choose the destination folder (e.g. c:\Softune\Utilities\8FXprogrammer)



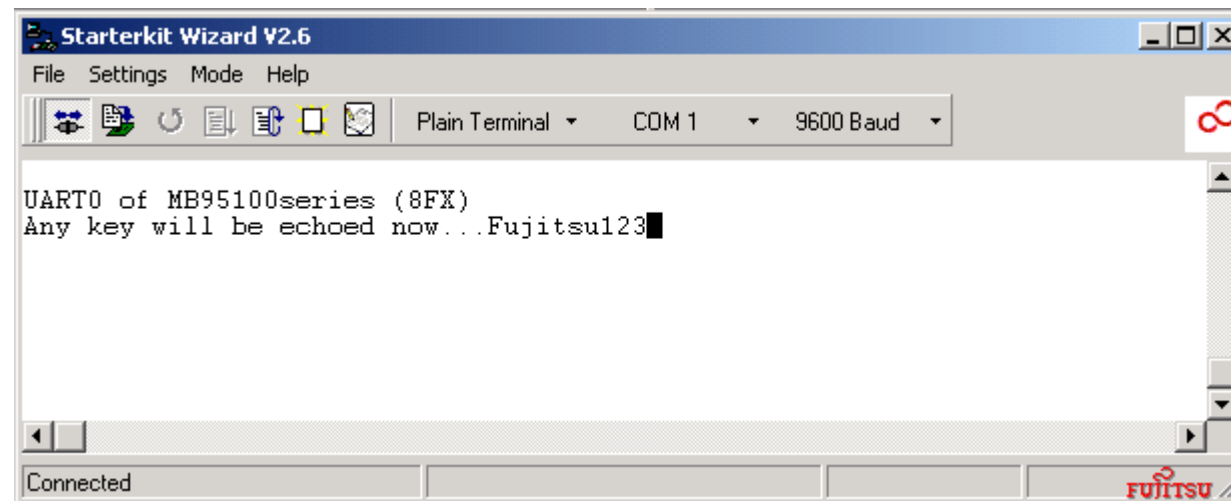


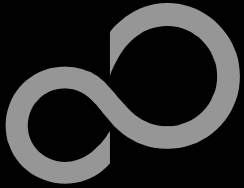
The Software

- Some more tools are available....

- SKwizard

- Free of charge, no registration required
- Windows based terminal program
- [Start installation](#)
 - choose destination folder (e.g. c:\Softune\Utilities\SKwizard)





Software Examples



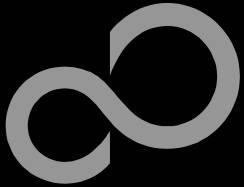
■ The following examples are provided with the CONCERTO-Kit CD

- Template ,Empty' project as base for the 8FX family
- Template_CONCERTOkit Template for CONCERTO-Kit applications
- ADC Example for the AD-converter
- CONCERTO-Kit Example for the CONCERTO-Kit
- 7SegCounter Example for I/O ports
- IOPort Example for I/O ports
- ExtInt Example for external interrupts
- PPGTimer Example for the PPG-Timer
- PPGxx Examples for the PPG in different modes
- UART Example for UART
- LIN_UART Example for LIN-UART
- ReloadTimer Example for reload timer

(Detailed program descriptions can be found in each project's 'readme.txt')

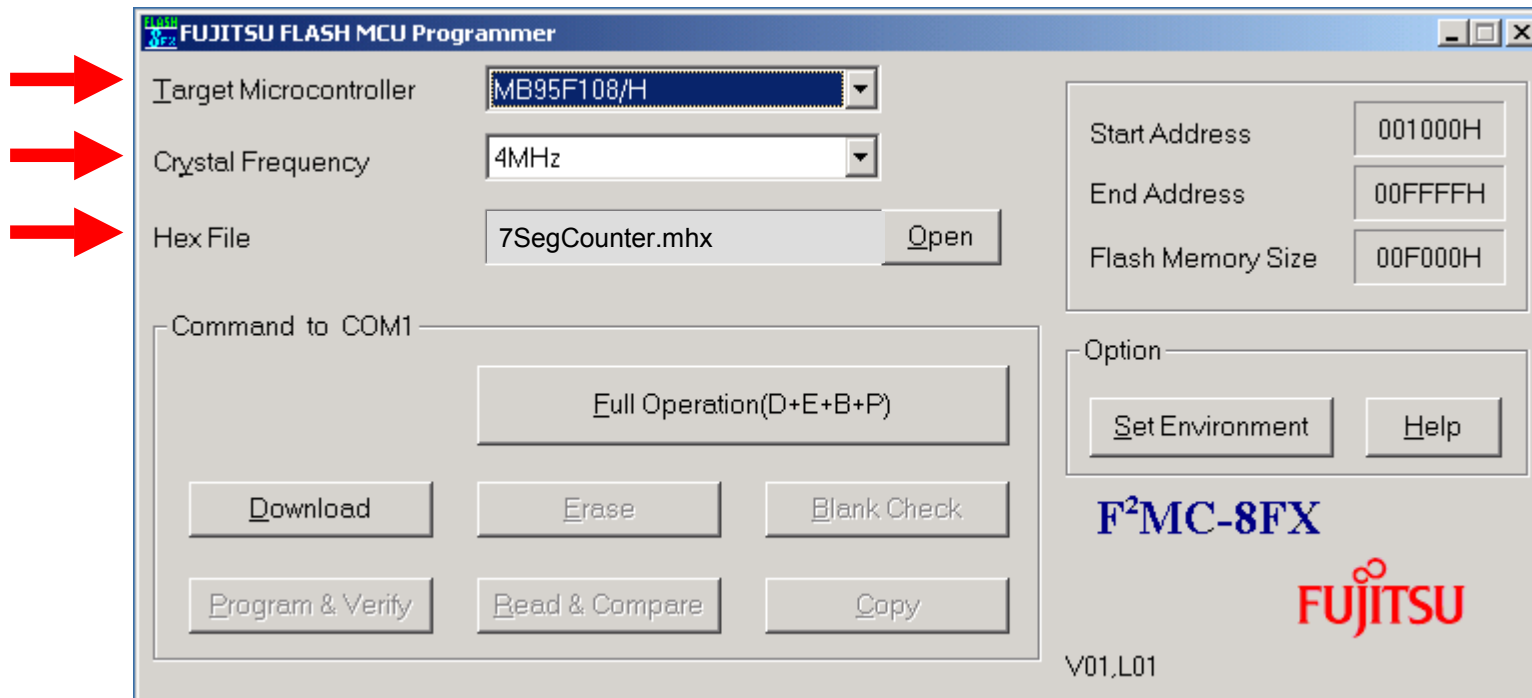
Start installation

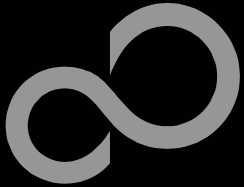
- choose destination folder
(e.g. C:\Softune\sample\Smpl8\951xx)



Program Download

- Start the Fujitsu MCU flash programmer
- Select the target microcontroller (MB95F108/H)
- Select the crystal frequency (4MHz)
- Choose the software example from the example\‘ABS‘-folder (e.g. C:\Softune\smpl8\CONCERTO-Kit\7SegCounter\abs\7SegCounter.mhx)





Program Download

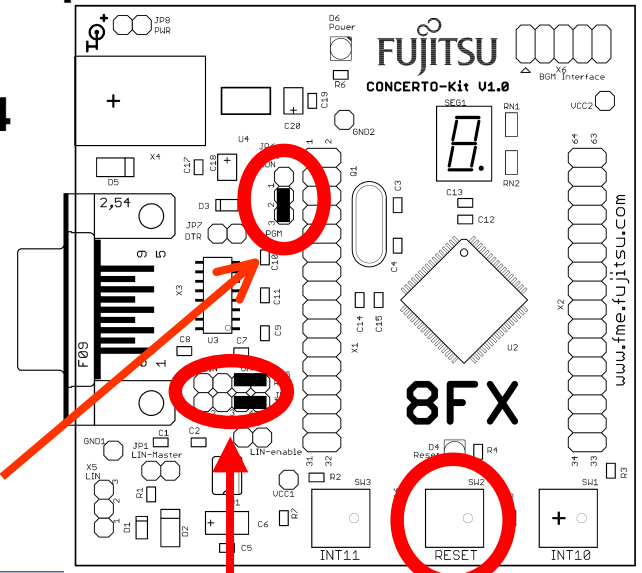
- Connect X3 (Sub D9) to the PC's COM port
- Set jumper JP6 to position ,PGM'
- Set jumper JP4 + JP5 to position 3-4
- Connect power supply
- Press ,Download' button
- Press button ,Reset'
- Press 'OK'

COM port

Use 1:1 cable for PC-connection

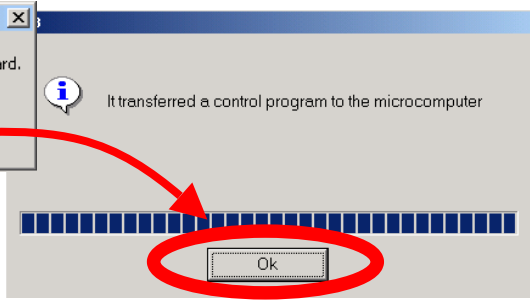
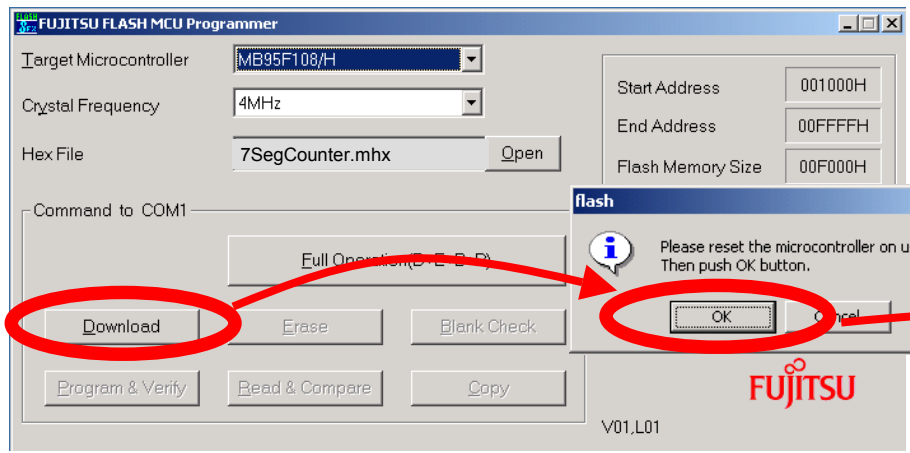
JP1: Mode selection

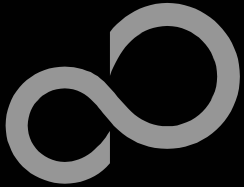
PGM: Set jumper to position 2-3 in order to select the program-mode



JP4 + JP5: RxD/TxD

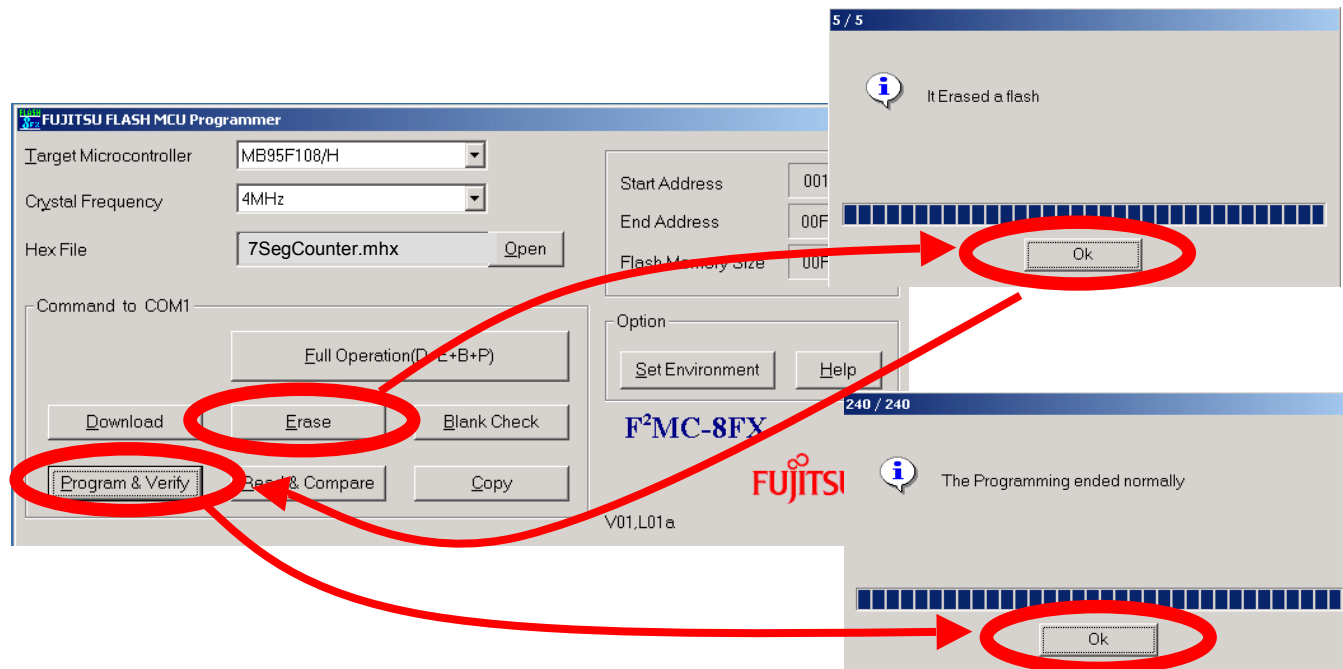
Button ,RESET'

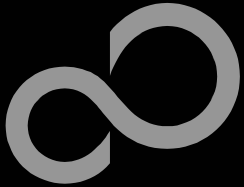




Program Download

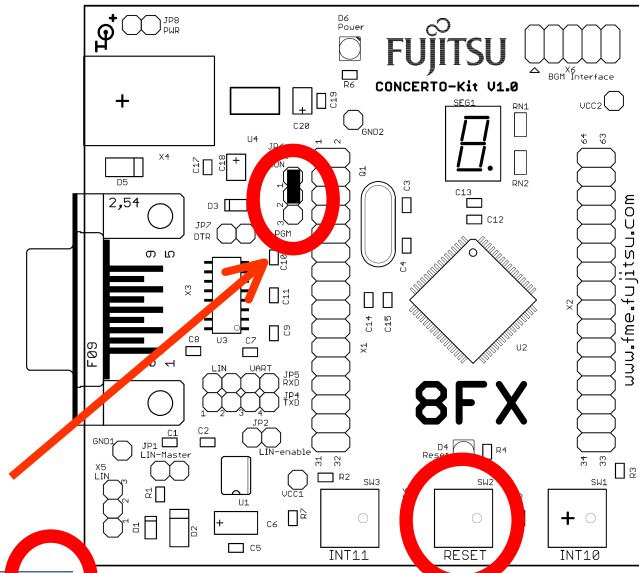
- Click ,Erase' button
- After successful erase click ,OK'
- Click ,Program & Verify' button
- After successful programming click ,OK'





Program Download

- Close the MCU flash programmer
- Power off the board
- Set jumper JP6 to position ,RUN‘
- Power on the board
- Press ,Reset‘



COM port

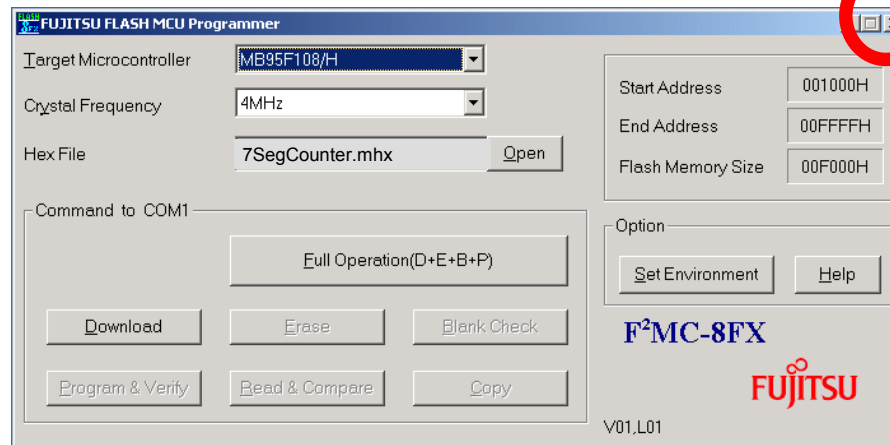
Use 1:1 cable for PC-connection

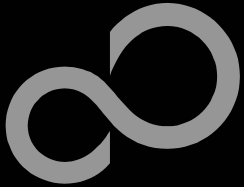
JP1: Mode selection

PGM: Set jumper to position 2-3 in order to select the program-mode

Button ,RESET‘

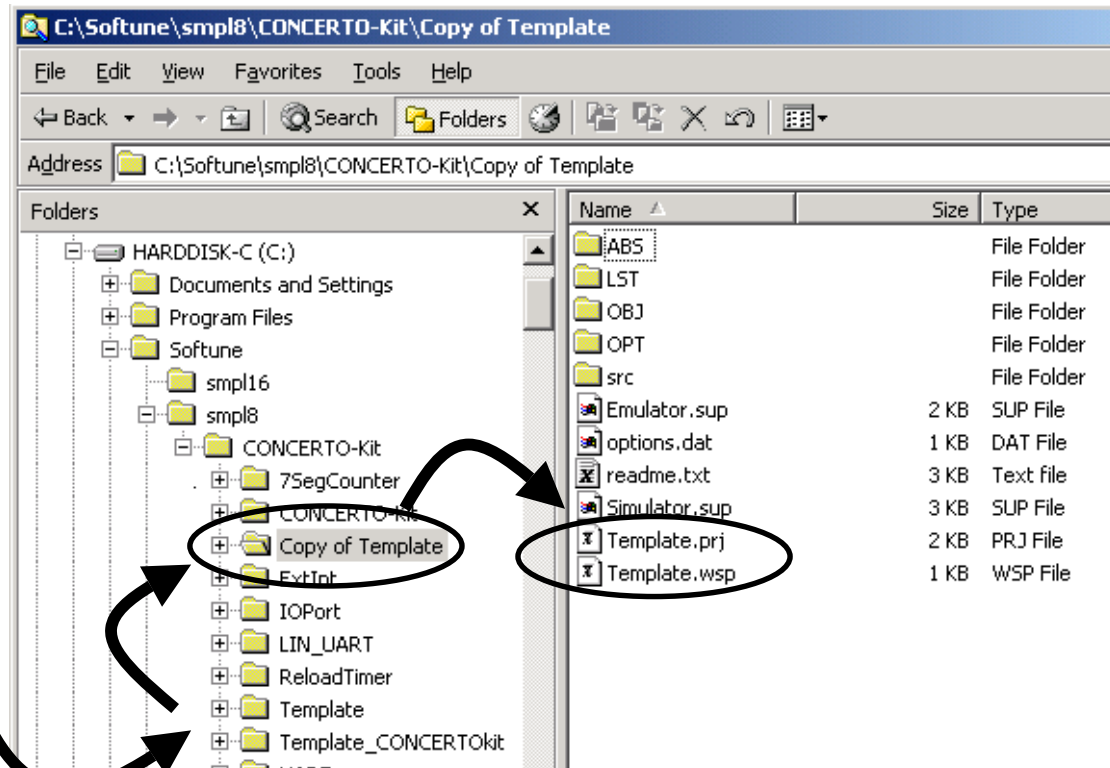
Close the flash programmer

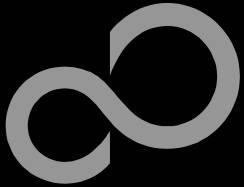




New Project

- To start a new project use the **CONCERTO-Kit** template project
 - This project includes the startup code, header files and vector table
- Copy the folder 'Template_CONCERTOkit' within the example-folder
 - Rename 'Copy of Template' into 'my_application'





New Project

■ Enter 'my_application'-folder

- Rename 'template.prj' into 'my_application.prj'
- Rename 'template.wsp' into 'my_application.wsp'

■ Edit 'my_application.prj'

- rename 'template' -> 'my_application'

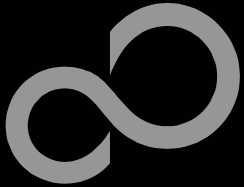
■ Edit 'my_application.wsp'

- rename 'template' -> 'my_application'

```
Template.prj - Notepad
File Edit Format Help
[DirInfo]
PRJ=C:\softtune\Smpl8F\Template\
...
[MEMBER-Debug]
F0=5
F1=0 m 1 ABS\Template.abs
F2=0 a 1 src\startup.asm
```

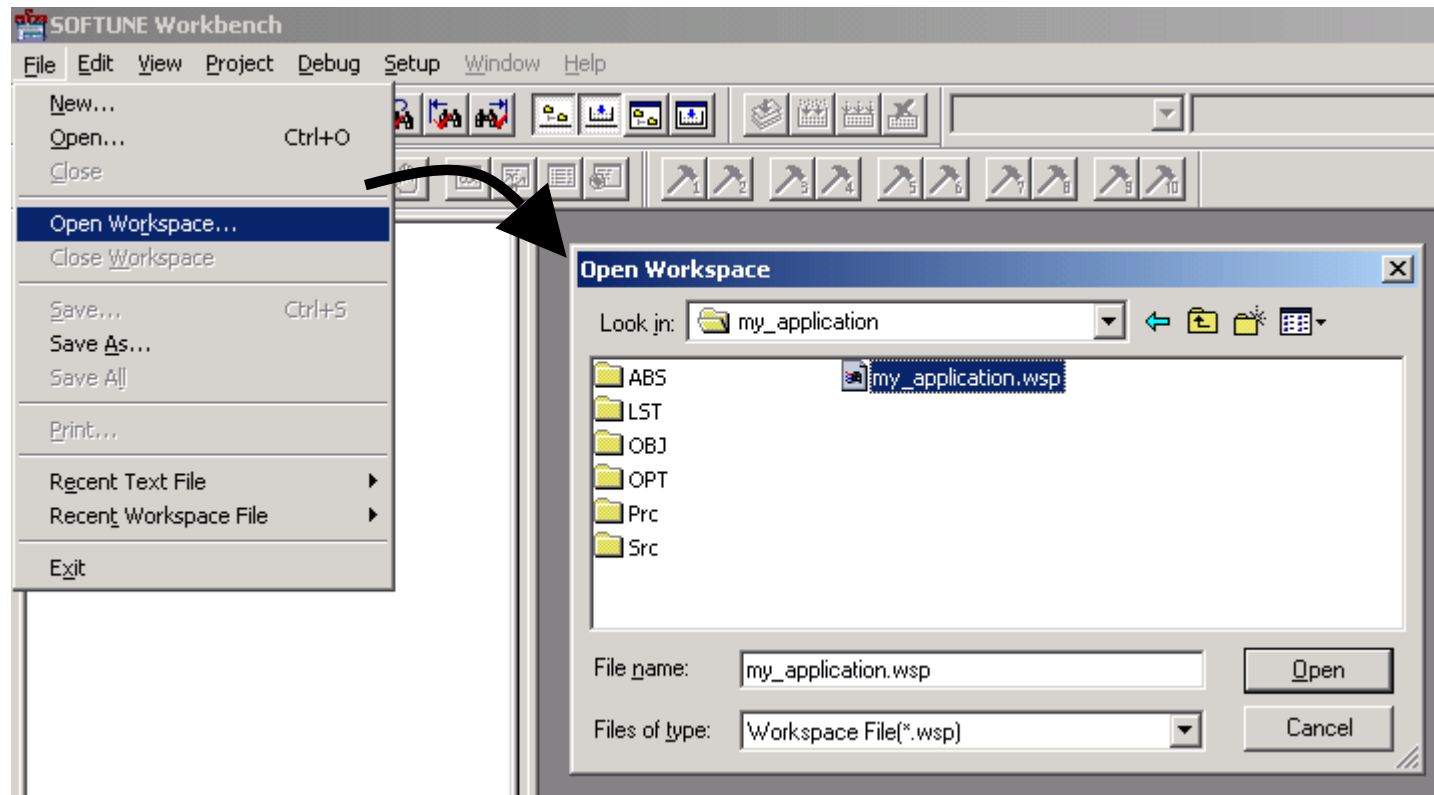
```
Template.wsp - Notepad
File Edit Format Help
[PrjFile]
Count=1
FILE-0=Template.prj
ActivePrj=Template.prj
[SubPrj-Template.prj]
Count=0
[DirInfo]
WSP=C:\softtune\Smpl8F\Template\
```

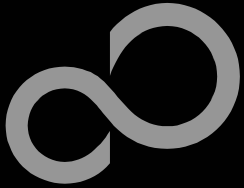




New Project

- Start Softune Workbench and open your project





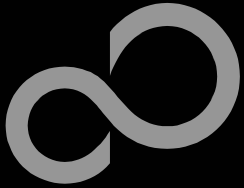
New Project

■ Write your application code

- Start.asm : Startup code
- Vector.c : Vector table
- Main.c : Your application

The screenshot shows the SOFTUNE Workbench interface. On the left, a project tree for 'my_application' is visible, containing source files like 'main.c', 'mb95100.asm', 'readme.txt', 'startup.asm', and 'vectors.c'. An arrow points from 'main.c' in the tree to the main editing window. The editing window displays the following C code:

```
40 /******  
41 /* Main Routine */  
42 /******  
43  
44 unsigned long delay;  
45 unsigned char counter;  
46  
47 void main(void)  
48 {  
49  
50  
51 InitIrqLevels(); /* Disable Interrupt */  
52 _EI(); /* enable interrupt */  
53 DDR6 = 0xFF;  
54 PDR6 = 0x00;  
55 counter = 0;  
56  
57 while(1)  
58 {  
59 PDR6 = seg_display[counter++];  
60 for(delay = 0; delay < 10000; delay++)  
61 asm("\tNOP");  
62 if (counter == 10)  
63 counter = 0;  
64 }  
65 }  
66  
67  
68
```

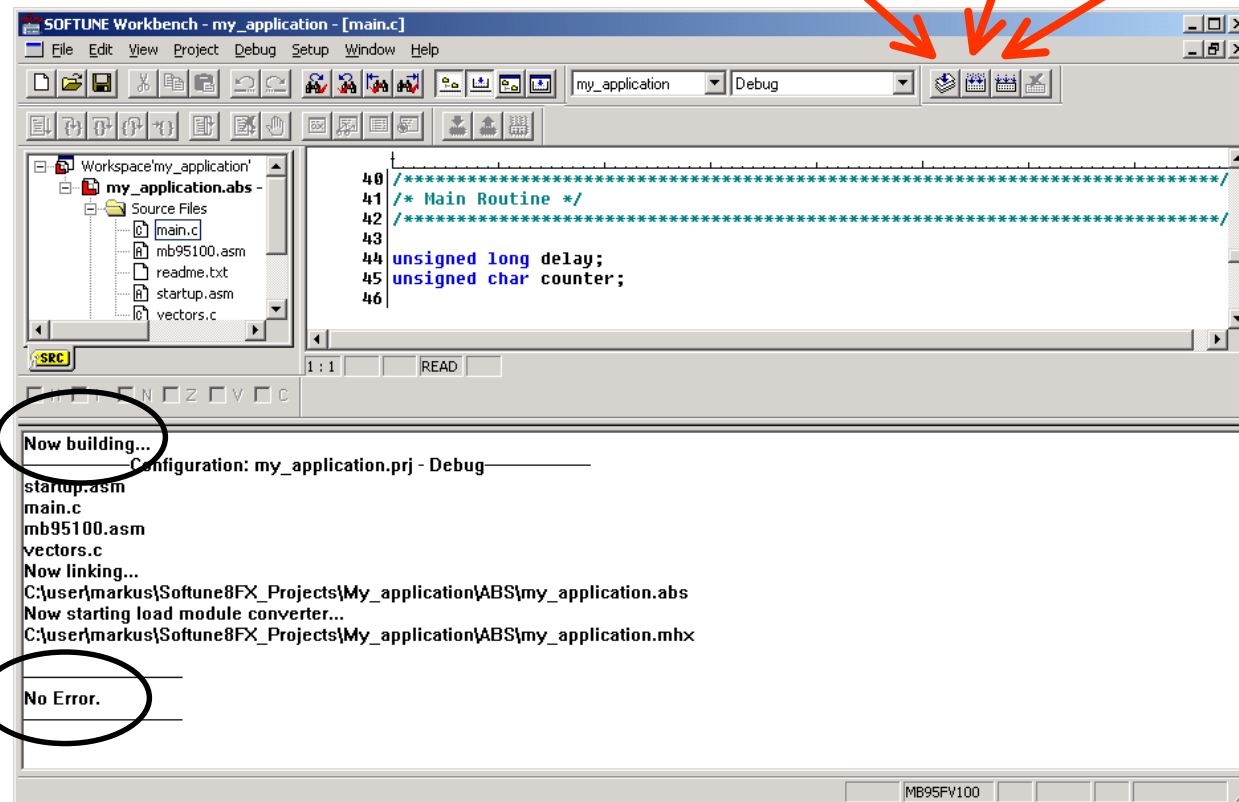


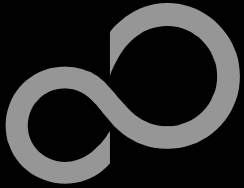
New Project

■ Compile & build your project

- Generates the MHX-file, which can be programmed to the flash

Compile Make Build





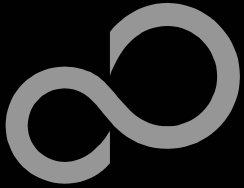
New Project



- You have finished your first project

Congratulations!

- Please see our application note ['Getting started'](#) for a more detailed introduction.



Further Steps

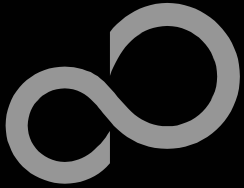


■ In order to learn more about Fujitsu microcontrollers

- See our application notes
 - www.fme.gsdc.de/macrofam/applica0.htm
- See our software examples
 - www.fme.gsdc.de/products/samples.htm

■ Contact your local distributor ...

- for individual support
- to order the latest "Fujitsu Micros CD" containing all information regarding Fujitsu 8-bit, 16-bit and 32-bit microcontrollers



Optional Tools



■ High-end evaluation board

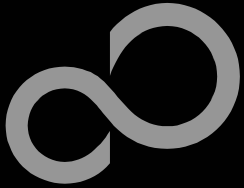
- MB2146-401 F²MC-8FX evaluation board

■ Hardware emulator

- MB2146-09 BGM adaptor
- MB2146-301 MCU board (3V version)
 - Includes evaluation chip MB95FV100-101
- MB2146-303 MCU board (5V version)
 - Includes evaluation chip MB95FV100-103
- MB2146-210/220/221 Header Boards

■ 8FX Family

- Flash Devices of F²MC-8FX family

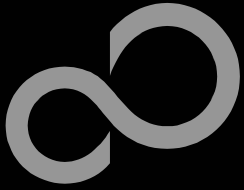


Evaluation Board

MB2146-401 F²MC-8FX Evaluation Board

- Emulator target board
- 3V or 5V MCU board can be used
- 16x 'User'-LEDs
- 'Reset'-button
- I/F-connector for expansion
- All pins routed to breadboard area



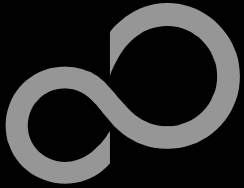


Hardware Emulator

■ MB2146-09 In-Circuit emulator for F²MC-8FX

- USB communication interface
- Connected to target system via user interface connector (BGM)
- 256 code / 2 data event breakpoints
- Sequential breakpoints (2 levels)
- Trace function





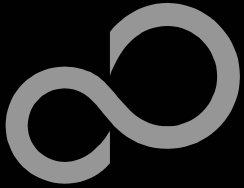
Hardware Emulator



■ MCU Board

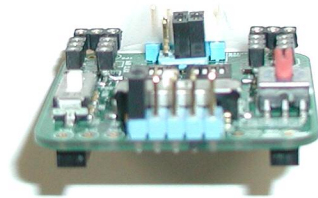
- MB2146-301 MCU board (3V version)
 - Includes evaluation chip MB95FV100-101
- MB2146-303 MCU board (5V version)
 - Includes evaluation chip MB95FV100-103



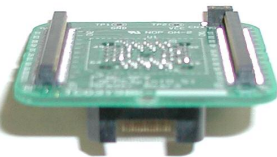


Header Boards

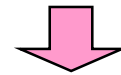
- Connect MCU board with evaluation chip to your target system



MCU board



Header board



Socket on user target system

MB2146-221:
LQFP-64pin, 0.65mm

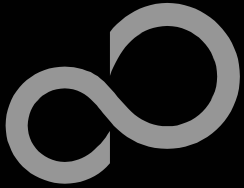


MB2146-220:
LQFP-64pin, 0.5mm



MB2146-210:
LQFP-48pin, 0.5mm





F²MC-8FX Family Overview



■ 64-pin devices

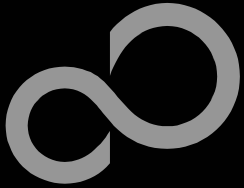
- [MB95F108AHSPFM](#) (5V, 60k dual-operation Flash, 2k RAM, single clock)
- [MB95F108AHWPFM](#) (5V, 60k dual-operation Flash, 2k RAM, dual clock)
- [MB95F108ASPFV](#) (3V, 60k dual-operation Flash, 2k RAM, single clock)
- [MB95F108AWPFV](#) (3V, 60k dual-operation Flash, 2k RAM, dual clock)

■ 48-pin devices

- [MB95F118AHSPFM](#) (5V, 60k dual-operation Flash, 2k RAM, single clock)
- [MB95F118AHWPFM](#) (5V, 60k dual-operation Flash, 2k RAM, dual clock)
- [MB95F118ASPFV](#) (3V, 60k dual-operation Flash, 2k RAM, single clock)
- [MB95F118AWPFV](#) (3V, 60k dual-operation Flash, 2k RAM, dual clock)

■ Further devices from 20-pin up to 100-pins are coming soon!

- Check our website for updates: www.fme.gsdc.de/gsd.htm

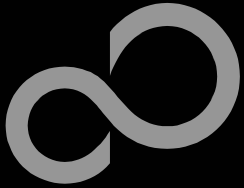


Contacts - Distribution



■ European distributors

- ATeG-Anatec AG www.anatec.ch
- ATeG-GD Technik Limited www.GD-Technik.com
- ATeG-Ineltek GmbH www.ineltek.de
- EBV Elektronik GmbH www.ebv.com
- Glyn GmbH & Co. KG www.glyn.de
- Glyn Ltd. www.glyn.com
- Malpassi srl www.malpassi.it
- Melchioni Electronica SpA www.melchioni.it
- PN Electronics www.pne.fr
- Rutronik GmbH www.rutronik.com
- Sagitrón www.sagitron.es/english.htm



Fujitsu Microelectronics Europe



■ Germany (Headquarters)

- Am Siebenstein 6-10, D-63303 Dreieich-Buchschlag
- Tel: (0 61 03) 69 00, Fax: (0 61 03) 69 01 22

■ France

- 105 rue Jules Guesde, F-92300 Levallois Perret
- Tel: (01) 55 21 00 40, Fax: (01) 55 21 00 41

■ Italy

- Palazzo Pitagora – Milano 3 City, Via Ludovico il Moro 4B, I-20080 Basiglio, Milano
- Tel: (02) 90 45 02 1, Fax: (02) 90 75 00 87

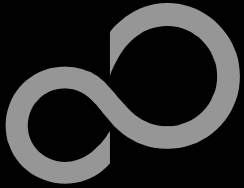
■ United Kingdom

- Network House, Norreys Drive, Maidenhead, Berkshire SL6 4FJ
- Tel: (01628) 50 46 00, Fax: (01628) 50 46 66

■ World-Wide-Web (Internet)

- www.fme.gsdc.de/gsdcd.htm
- www.fme.fujitsu.com
- Contact: micro_info@fme.fujitsu.com



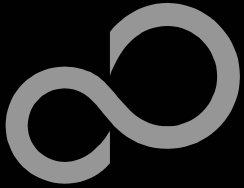


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■ 'CONCERTO-Kit'-CD Link-List

- Software
 - [Softune Workbench](#)
 - [MCU Flash Programmer](#)
 - [SKwizard](#)
 - [Software examples](#)
- Documents
 - [Schematic 'Concerto-Kit'](#)
 - [Data sheet MB95100A series](#)
 - [Data sheet MB95100AH series](#)
 - [Data sheet MB95110A series](#)
 - [Data sheet MB95110AH series](#)
 - [Hardware manual 8FX family](#)
 - [Programming manual 8FX family](#)
 - [Application note 'Getting Started'](#)
 - [Application note 'Emulator HW Setup'](#)
 - [Application note 'Flash Programming'](#)



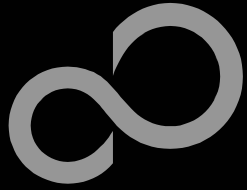


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■ 'CONCERTO-Kit'-CD Link-List

- Additional documents for 8FX Softune Workbench
 - [Assembler manual](#)
 - [C-compiler manual](#)
 - [Command reference manual](#)
 - [Linkage kit manual](#)
 - [Operation manual](#)
 - [User's manual](#)
- Additional documents for 8FX tools
 - [MCU Flash Programming Specifications](#)
 - [Operation manual MB2146-09 BGM adapter](#)
 - [Softune first step guide MB2146-09 BGM adapter](#)
 - [Operation manual MB2146-210 Header board](#)
 - [Operation manual MB2146-220 Header board](#)
 - [Operation manual MB2146-221 Header board](#)
 - [Operation manual MB2146-301 MCU board](#)
 - [Operation manual MB2146-303 MCU board](#)
 - [Operation manual MB2146-401 Evaluation board \(3V setup\)](#)
 - [Operation manual MB2146-401 Evaluation board \(5V setup\)](#)





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THE POSSIBILITIES ARE INFINITE